Permutit

Operating Cabinets and Tables

WITH MASTER VALVE CONTROL FOR FILTERS AND SOFTENERS

FULLY AUTOMATIC · SEMI-AUTOMATIC · MANUAL

Bulletin No. 2154

PERMUTIT MASTER VALVE CONTROL

INSURES UNIFORMLY GOOD RESULTS
SAVES OPERATING COSTS
ELIMINATES ERRORS

The old-fashioned way to operate the valves for gravity and large size pressure filters or zeolite softeners has always been to use hydraulic cylinders under control of a nest of small individually hand operated pilot valves or cocks, and usually this nest of individual pilot valves has been placed on a centrally located operating table with the various operating handles grouped together.

It was then up to the operator to learn when and in what sequence to open or close the individual pilot valves. For, if any filter or softener valve is opened at the wrong time, raw, untreated water may be sent to service. No wonder the human element has played such a critical part in every installation! No wonder minimization or total elimination of hand operation is most desirable for efficient, economical operation.

Permutit's contribution toward the elimination of errors in valve operation is the development of centralized, unitary control. In this control a master pilot valve operates the individual hydraulic valves. Thus, all the valve operations for a filter or softener unit are mechanically tied together into a single operating shaft. A single indicator mounted on this single operating shaft clearly shows on a dial the operating step for which the valve control is set. Thus, the master valve control, even when manually operated, greatly simplifies the operator's task. Instead of a number of valve handles, there is only one crank to turn—only one rotary indicator to watch. In each operation of backwashing, downwashing, etc., the master control closes certain valves and opens others in the correct sequence. The operator cannot open the wrong valve at the wrong time. He cannot alter the sequence of operations. Even though he may be unfamiliar with the water treatment unit and with the principles involved, he can't help but operate the equipment correctly.

Permutit master manual valve control thus eliminates errors and simplifies the problem of *how* to operate the valves of a filter or softener. There still remains the problem of deciding *when* to operate them. The Permutit Automatic Control takes care of that. This electrical magician turns the master valve control to the right position at the right time with the precision and dependability of a fine watch. Thus automatic control relieves the operator of regular routine attention. All he needs to do is to inspect the equipment periodically at his convenience.

PERMUTIT MASTER PILOT CONTROL

consists essentially of a battery of individual, double-acting twin poppet pilot valves, operated by one

Fig. 1—Dual Marble Cabinet for Gravity Unit. Low Type. Width 48" for dual cabinet, 24" for single cabinet. Depth 28". Height to top of cabinet 40".

common shaft. Each of these pilot valves operates one hydraulic valve. The hydraulic valves are located in the piping on the front of the filter or softener unit where they belong. The master pilot valve assembly is mounted in an operating cabinet or table located on the main operating floor. Different types of cabinets are illustrated in Figs. 1, 2 and 3. The front cover illustration shows a filter plant equipped with Permutit master valve control housed in cabinets of the type shown in Fig. 2.

One individual poppet pilot valve is illustrated in Figs. 5 and 6 in position for opening and closing one hydraulic valve. As shown in these figures, the pilot valve has two water connections to the two ends of the hydraulic cylinder. The pilot valve casing also has two chambers, one connected to the pressure water supply and the other to waste. Each of the two water connections to the hydraulic cylinder is controlled by a double acting poppet so that each cylinder connection may be placed in communication with either pressure water supply or waste. One rocking operating lever actuates the stems of the two poppets so that they move in opposite directions. Thus, with the lever positioned for opening the hydraulic valve (Fig. 5) the bottom of the cylinder receives pressure water while the top of the cylinder discharges to waste. With the lever positioned for closing the hydraulic valve (Fig. 6) the top of the cylinder receives pressure water and the bottom of the cylinder discharges to waste. The rocking of the lever is accomplished by a cam contacting a roller mounted on the lever.

The movement of the stems for the valve poppets is taken up by metal bellows instead of conventional stuffing boxes. These bellows permit free movement of the stems. Leakage along the stems as well as excessive friction is *permanently eliminated.* These difficulties are everyday occurrences with regular stuffing boxes, especially when they are improperly tightened.

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Fig. 2—Carrara Glass Cabinet for Gravity Unit, High Type. Width 24", Depth 24". Height to top of cabinet 58". Height to top of recorder 78".

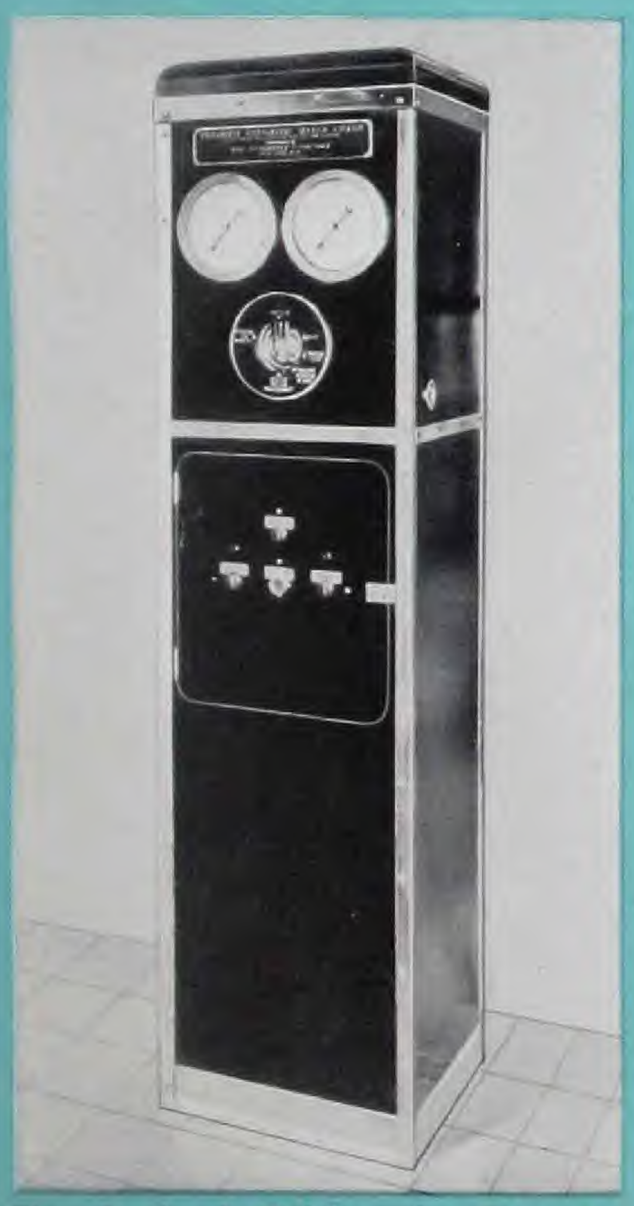

Fig. 3—Steel Cabinet for Pressure Unit. Width 18", Depth 24". Height 81".

Fig. 4—Top View of Dual Marble Cabinet, Low Type.

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ADVANTAGES OF AUTOMATIC CONTROL

Some plants, such as small municipal water works or isolated railroad water stations, may not have a regular attendant, or large water treatment plants may include so large a number of softeners or filters, together with other equipment, that one operator cannot take care of them efficiently with manual operation. In either case fully automatic control is the solution.

Many plants have one operator assigned to several different duties. When such a hard-driven operator inspects a unit he may find the run not yet complete. However, to avoid over-running, he will be tempted to recondition prematurely. Thus water and, in the case of softeners, salt is wasted. On the other hand the operator may not be there just when reconditioning is required. A softener thus allowed to overrun naturally discharges hard water to service; a filter builds up an excessive loss of head which may cause the filter output to fall below the demand or impure water to break through. Automatic control eliminates these difficulties. It carries out all operations without attention and on time, neither too soon nor too late. Rate of flow and time duration control of backwashing, and rinsing or filtering-to-waste prevents waste of water in these operations and maintains the zeolite or sand bed in a clean, active condition; furthermore, the slow opening and closing of the valves prevents disturbances of the bed. In softeners, salt waste is avoided by mechanical measuring of the correct quantity of concentrated brine. Thus, the production of correctly treated water at a minimum of operating expense is assured.

An operator in a hurry, a change in personnel, absence due to illness—none of these everyday occurrences can interfere with the quality of water delivered under fully automatic control.

ONE MASTER PILOT CONTROL CAN SERVE AN ENTIRE FILTER BATTERY

In cases where ample filtered water storage is available or where the demand for filtered water is intermittent so that a group of filters may be taken out of service periodically, a single master pilot control may be used to control the entire battery of two or more filters. This requires a special layout of the piping and hydraulic valves and the control is so arranged that one filter after another is backwashed while flow through the other filters is stopped. Then all the filters are downwashed together whereupon the battery is returned to service. This type of group control is not recommended for softeners.

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Fig. 1—Dual Marble Cabinet for Gravity Unit, Low Type. Width 48" for dual cabinet, 24" for single cabinet. Depth 28". Height to top of cabinet 40".

One individual poppet pilot valve is illustrated in Figs. 5 and 6 in position for opening and closing one hydraulic valve. As shown in these figures, the pilot valve has two water connections to the two ends of the hydraulic cylinder. The pilot valve casing also has two chambers, one connected to the pressure water supply and the other to waste. Each of the two water connections to the hydraulic cylinder is controlled by a double acting poppet so that each cylinder connection may be placed in communication with either pressure water supply or waste. One rocking operating lever actuates the stems of the two poppets so that they move in opposite directions. Thus, with the lever positioned for opening the hydraulic valve (Fig. 5) the bottom of the cylinder receives pressure water while the top of the cylinder discharges to waste. With the lever positioned for closing the hydraulic valve (Fig. 6) the top of the cylinder receives pressure water and the bottom of the cylinder discharges to waste. The rocking of the lever is accomplished by a cam contacting a roller mounted on the lever.

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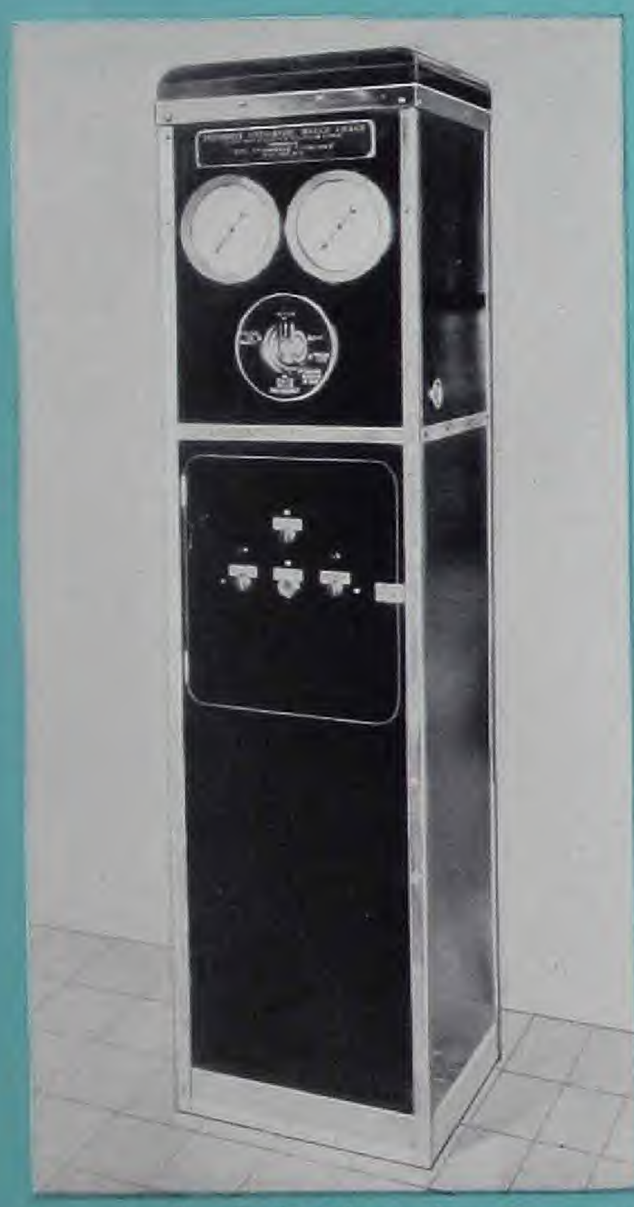

Fig. 3—Steel Cabinet for Pressure Unit. Width 18", Depth 24", Height 81".

Fig. 4—Top View of Dual Marble Cabinet. Low Type.

INDIVIDUAL POPPET PILOT VALVES
OPERATED BY ONE COMMON CAM SHAFT

The four to six poppet pilot valves required for control of each filter or softener unit are stacked up as shown in Fig. 7. All the cams are mounted on a common shaft which is turned by an electric motor or by a hand crank. The shape of the cams and their angular position on the cam shaft determines the sequence of valve operations. Thus, this design is completely flexible. The Master Pilot Control can readily be adapted to *any* desired cycle of operating steps of *any* filter or softener unit. Or, the operating cycle of an installed Master Control can subsequently be changed simply by altering the cam arrangement. A pilot valve position indicator on the cam shaft shows clearly at all times the operating step for which the cam shaft is set. One common pressure water and one common waste connection serve the entire group of pilot valves, thus simplifying the piping inside the cabinet.

IMPROVED ELECTRIC POSITION INDICATOR
FOR HYDRAULIC VALVES

The tailrod of each hydraulic valve cylinder actuates two limit switches which control the lights of a valve position indicator, clearly showing to the operator whether the valve is open or closed (See Figs. 5 and 6). The lights operate on 6 volt current, thus keeping undesirable high voltages away from the pipe gallery. This indicator is simple, reliable and positive. Old-fashioned mechanical position indicators with sheaves and counterweights actuated by means of cables were always getting out of order and constituted a serious source of annoyance to the operator.

The *pilot valve position indicator* shows the operating step such as backwashing etc., for which the control has been set. After the hydraulic valves have moved to their correct position this is shown by the lights of the *hydraulic valve position indicator.* The operator standing in front of the control cabinet knows at once that the orders given by the master control have been executed as directed (see Fig. 4).

FOUR DIFFERENT TYPES OF CONTROL AVAILABLE

(1) Fully Automatic Control. The motor which turns the cam shaft is controlled by a group of switches. The switch which starts the reconditioning cycle is usually actuated for a filter by a loss-of-head gauge, or by a time clock; for a softener, by a water meter or by a time clock. The duration of the individual steps of the reconditioning cycle, such as backwashing and rinsing or filtering to waste, is controlled by time switches and float switches. In every case these switches energize the motor after an operating step has been completed. When the Master Pilot Valve Control has then moved to the next position the motor is again de-energized by a circuit breaker attached to the cam shaft. Thus, correct positioning of the master control is assured.

(2) Semi-Automatic Control. This type of control is similar in all respects to fully automatic control except that the reconditioning cycle is started by hand. The operator pushes a button—the automatic control carries the unit through the reconditioning cycle and returns it to service without further attention.

(3) Manual Electric Control. The motor which turns the cam shaft is controlled by a manual switch. The operator starts and stops the motor by means of this switch at the start and finish of each operation.

(4) Manual Control. No motor is provided and the operator turns the cam shaft by means of a hand crank to set the master control for the desired operating position.

Manual electric control is readily convertible to semi-automatic or fully automatic control at relatively small expense merely by adding the electrical devices required.

PERMUTIT MASTER VALVE CONTROL ADAPTABLE TO EXISTING PLANTS

Permutit master valve control for either manual or automatic operation can be fitted to existing softeners and filters. Thus, the user interested in modernizing his plant may also avail himself of savings in operating costs and benefit by treated water of uniformly high quality.

Automatic softeners may be made smaller than the manual type. Manually operated softeners are usually made large enough to run for 6 to 24 hours between regenerations in order to save the operator's time by avoiding too frequent regeneration. Because of the self-regenerating feature, the automatic may be smaller and yet produce the same daily soft water output as the larger manually operated type, without the excessive attention which a smaller manual softener would require. Thus, on new installations, a saving in first cost may be realized, and on existing installations the daily capacity *can sometimes be increased* merely by changing to automatic operation.

SPECIFICATIONS

A control cabinet shall be provided for each (filter) (softener). For two adjacent (filters) (softeners) a dual cabinet may be used. Each cabinet shall have a frame of welded steel construction supporting the equipment installed in the cabinet. The back of the cabinet shall be left open for easy access. All exposed hardware, bolts and other fastenings shall be heavily chromium plated. The cabinet shall be covered with (specify A or B)

A. Steel sheets, painted black, with chromium trim.

B. (Gray Tennessee Marble) (Carrara glass) (other material). The tops shall be not less than 1¼" thick with beveled edges, front and sides. Material used in front and sides shall be 1" thick. If the cabinet is provided with a removable front panel, it shall be made of quartered oak, properly finished and varnished.

Each cabinet shall contain a complete master pilot control for governing the operation of one (filter) (softener). The control shall include one double acting twin poppet pilot valve for each hydraulic valve or group of hydraulic valves operating in unison. The poppet valves shall be provided with metal bellows: stuffing boxes will not be accepted. Each pilot valve shall be actuated by a cam, all cams to be mounted on a common cam shaft provided with a pilot valve position indicator showing the operating steps on a chromium plated dial. The pilot control shall be arranged for (specify A, B, C or D)

A. Fully automatic operation, the reconditioning cycle to be started by a switch actuated by a (water meter) (time clock) (loss of head gauge) and carried to its conclusion by other devices controlling an electric motor which drives the cam shaft.

B. Semi-automatic operation, the reconditioning cycle to be initiated by a manual momentary contact starter and carried to its conclusion automatically by electrical devices controlling an electric motor which drives the cam shaft.

C. Manually controlled electric operation, a hand switch to control the operation of an electric motor which drives the cam shaft.

D. Manual operation with a hand crank to turn the cam shaft.

All above specified electrical devices shall operate on electric current of . . .

Each cabinet shall be provided with electric position indicators for each hydraulic valve to operate on 6 volt current. Limit switches for installation on the tailrods of the hydraulic valves shall be furnished to control the valve position indicators.

THE PERMUTIT COMPANY

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